

## SWAMP Surface Water Ambient Monitoring Program

### Vision Statement:

The vision for SWAMP Data Management (DM) is to provide credible ambient monitoring data and make information available to all stakeholders in a timely manner. SWAMP's goal is to facilitate the use of data for decision making processes and to create and document systems which ensure data comparability.



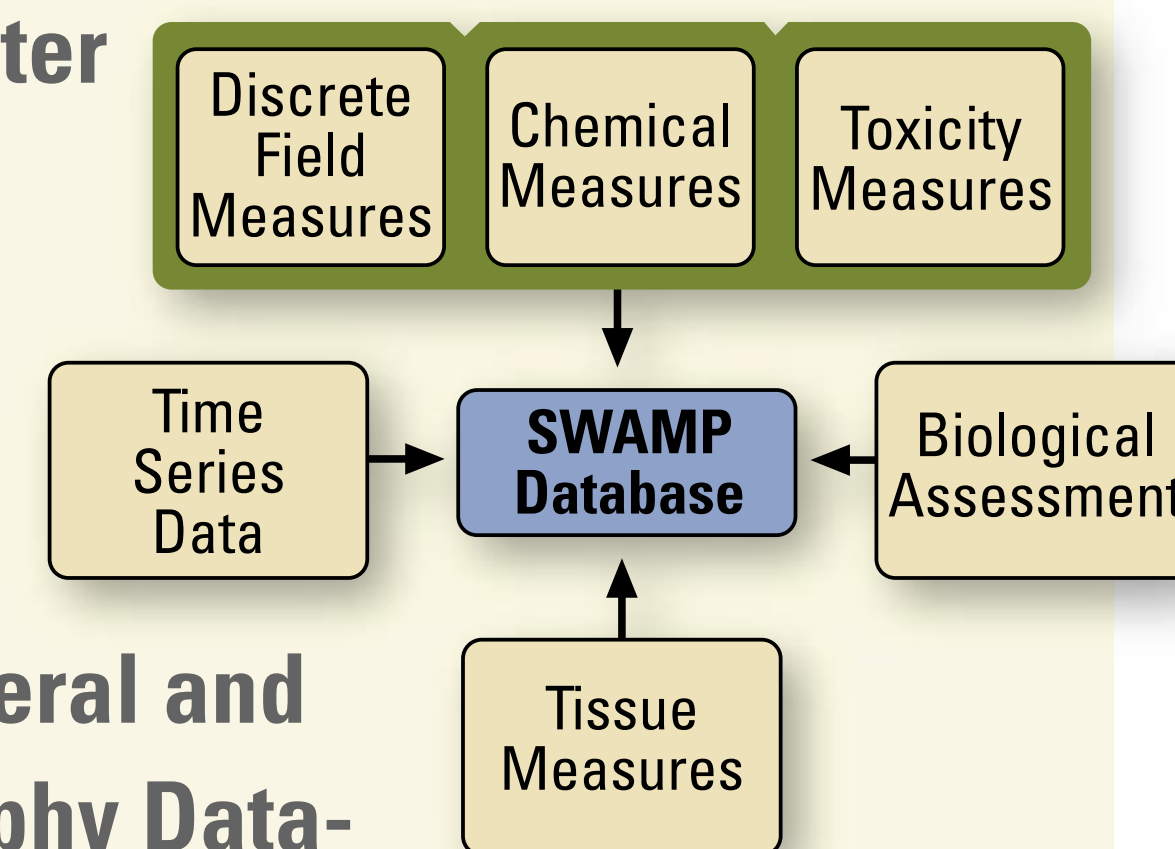
### Contact SWAMP

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# SWAMP Data Management

## What is SWAMP Data Management?

The main functions of SWAMP Data Management are to accept, manage and store SWAMP data and to share this data within SWAMP and among stakeholders. The foundation for this information management system is a centralized storage database designed around a sample-driven model where geospatial data are captured with every sample collected. The database is designed to transfer data into larger data exchange networks. Water quality, toxicity, sediment chemistry, microbiological, habitat, biological, fish and shellfish tissue data and metadata are managed within a central database that is fed from peripheral databases. Each sample can be traced back to a specific location associated with federal and state assessment units such as the National Hydrography Dataset (NHD), CalWater and Regional Water Board Basin Plans to produce an integrated hydrologic unit assessment of the state's surface waters.

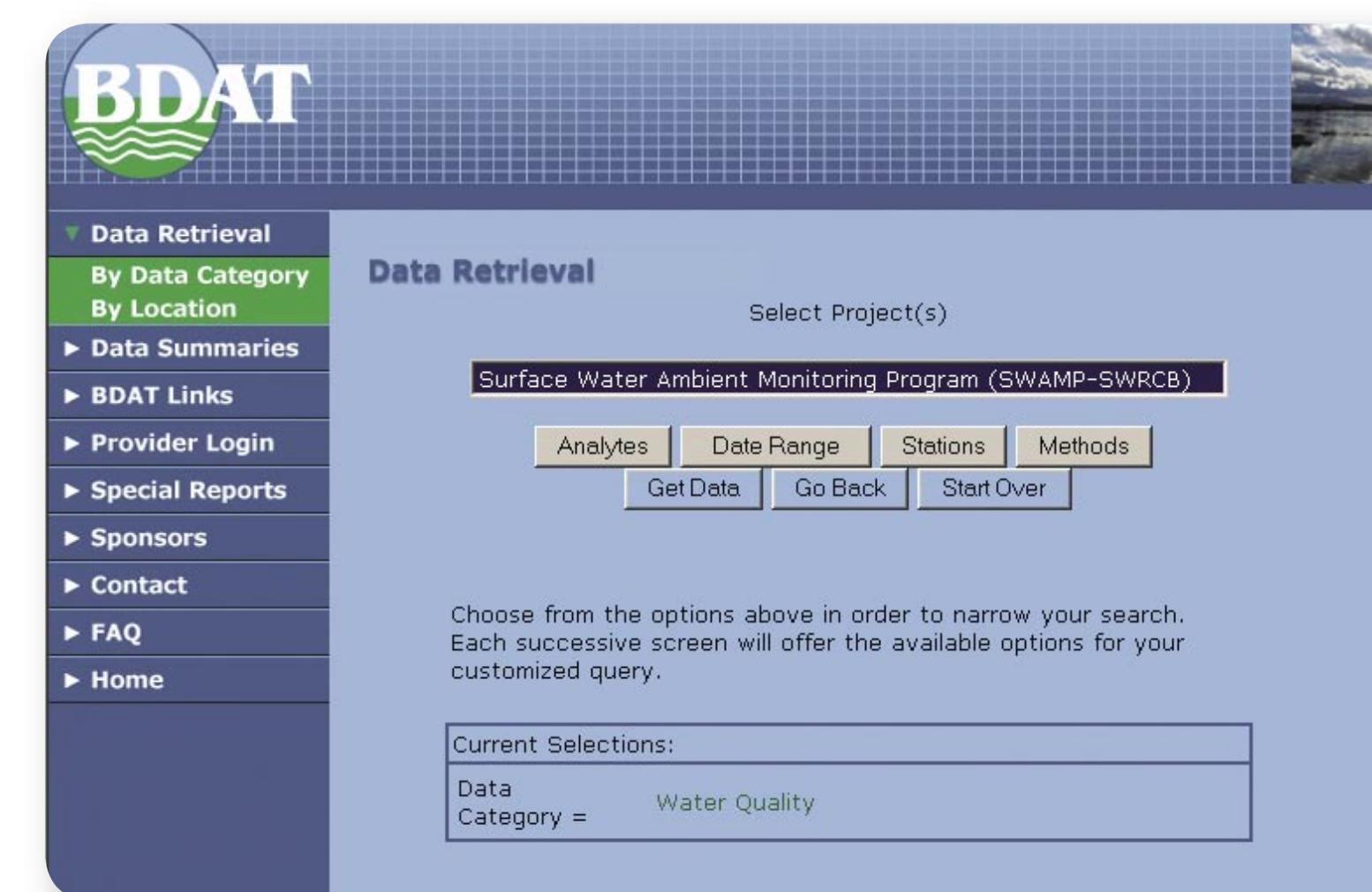


## Why is SWAMP Data Management necessary?

An immense and diverse project such as SWAMP requires a data management system that integrates current data management technology with human administration of data. Establishing procedures, rules and formats within this system produces comparable and verified data throughout the state that local, regional or state stakeholders can use.

## How the data flows:

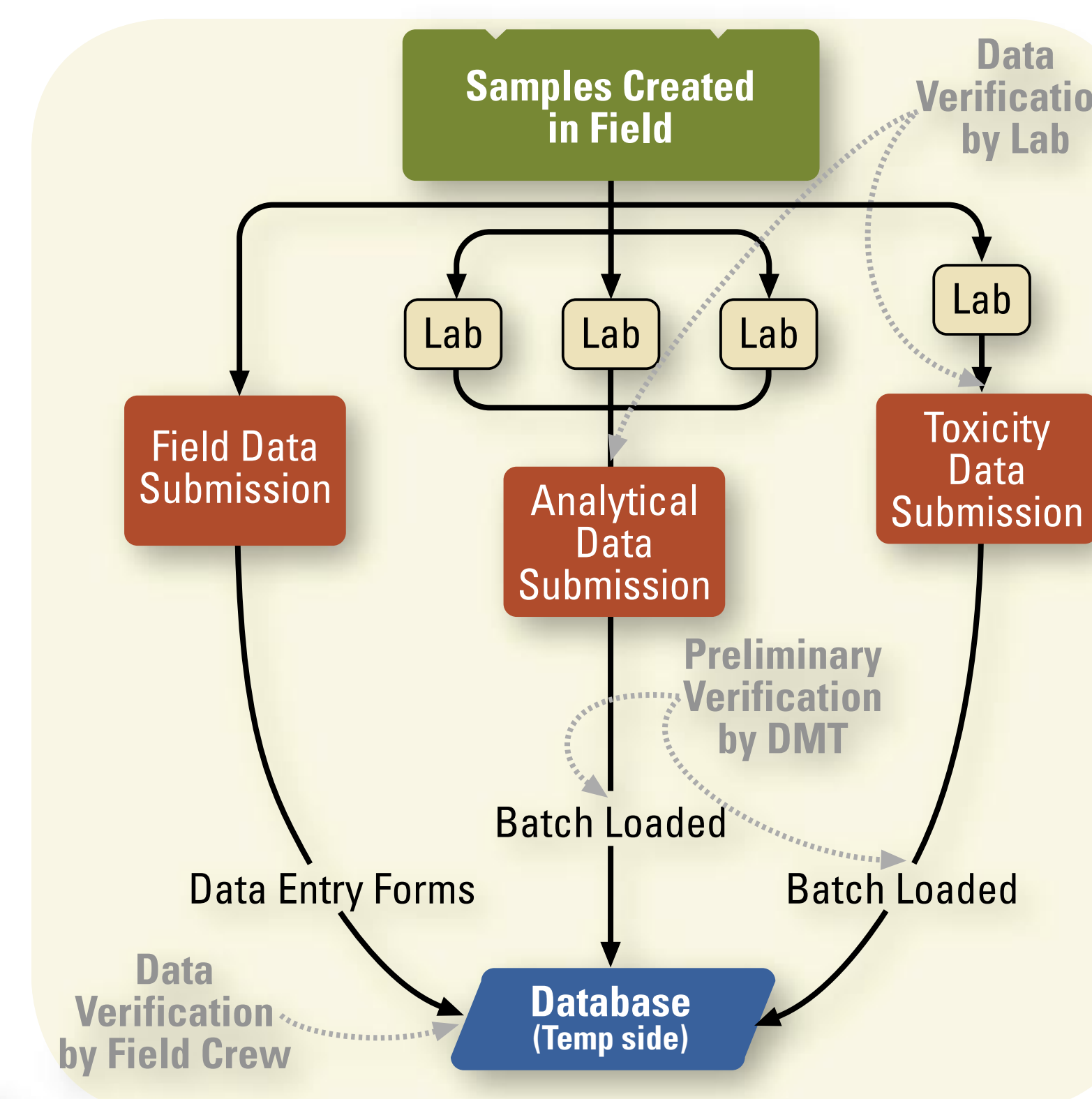
In summary, the SWAMP Access database has both a temporary and permanent side for data storage. Data on the temporary side are accessible through Microsoft Access to the regional board staff (RBS) for initial data screening. Data verification and compliance coding are then performed using tools developed by the data management Team (DMT) at Moss Landing. Once the DMT has performed a series of completeness checks and verification, the data are transferred to the permanent side of the



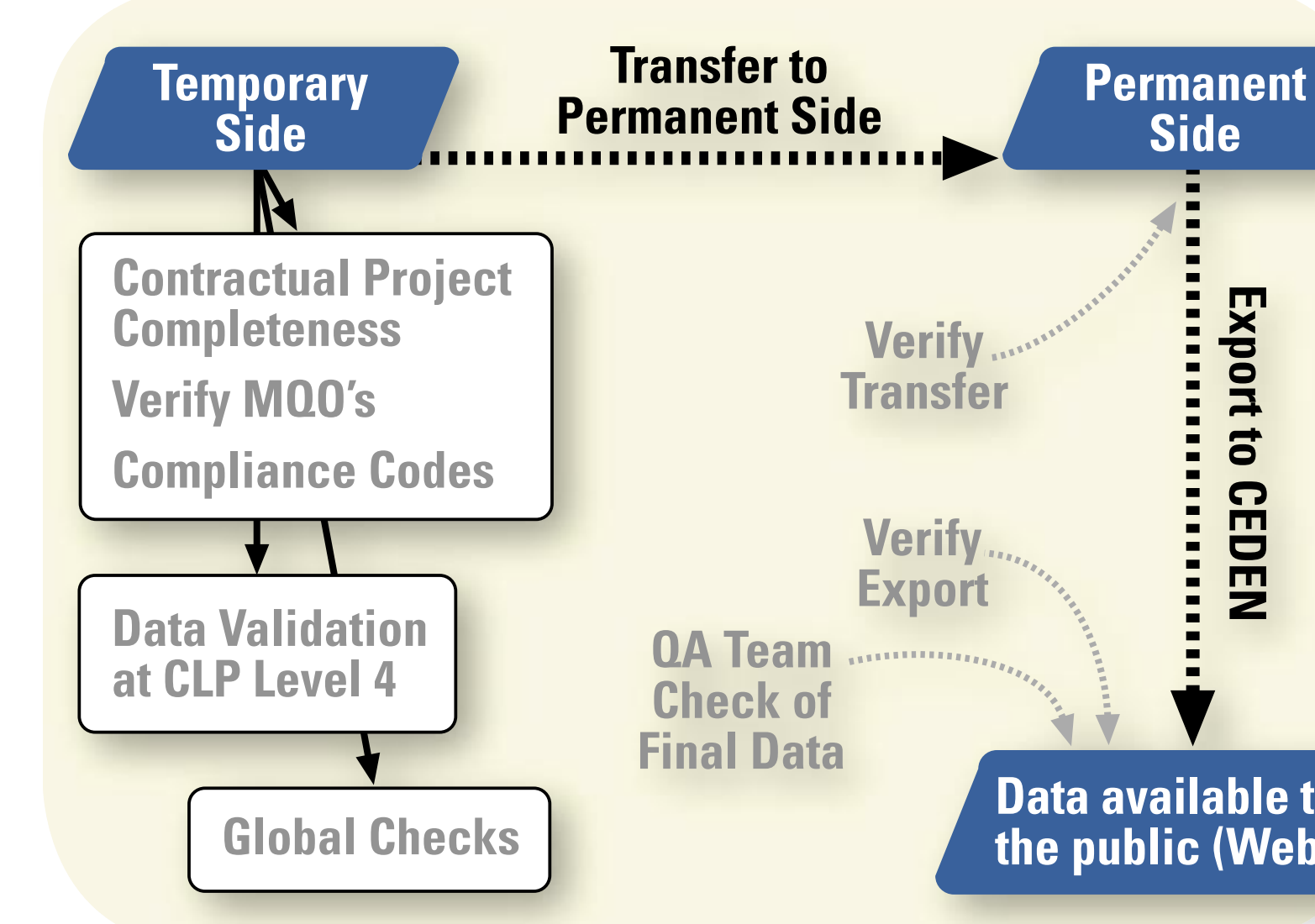
database. Data on the permanent side are accessible to the public through Web interfaces from the California Environmental Data Exchange Network CEDEN: <http://bdat.ca.gov/>. The next column provides a more detailed description of the SWAMP data management process. Field

crews collect environmental and probe data along with chemistry samples when they visit a station. The environmental (weather and physical attributes, for example) and probe measurements (temperature, pH, oxygen, salinity) are entered in an Access database via customized data entry forms. The laboratories analyze the samples collected by the field crews and submit the analytical and quality assurance/quality control (QA/QC) data in standard formats to the DMT for loading into the database using automated loading programs. The field crews and laboratories provide the initial verification of their respective data.

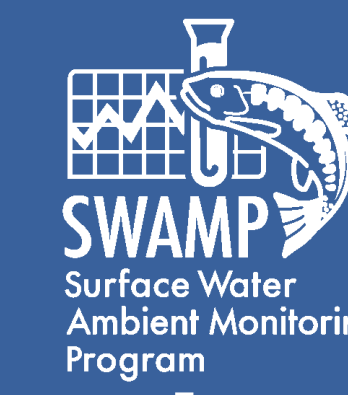
Once data are loaded onto the temporary side of the centralized database, the DMT, along with regional board staff, check the field and laboratory information for completeness against the contractual requirements for a given project year. The DMT regional liaison also confirms that the station information, including NHD, CalWater v2.21 and Regional Water Board Basin Plan numbers and target latitudes and longitudes are complete.



The Data Management Team then verifies the data using standard procedures in the SWAMP Quality Management Plan (QMP) against the data quality indicators, and a summary compliance code (that is, Compliant, Historical, Estimated or Rejected) is assigned to each individual data result in the database. The DMT also performs routine checks to ensure all data on the temporary and permanent side of the database are comparable at a global and an analytical batch level.



After the previous steps are completed, data are transferred to the permanent side of the database and checked for transfer completeness and accuracy. Data from the permanent side of the database are then available for Data Quality Assessments and interpretive reporting by regional and state board staff. Furthermore, data on the permanent side are exported to a web interface through the California Environmental Data Exchange Network (CEDEN) for public access.



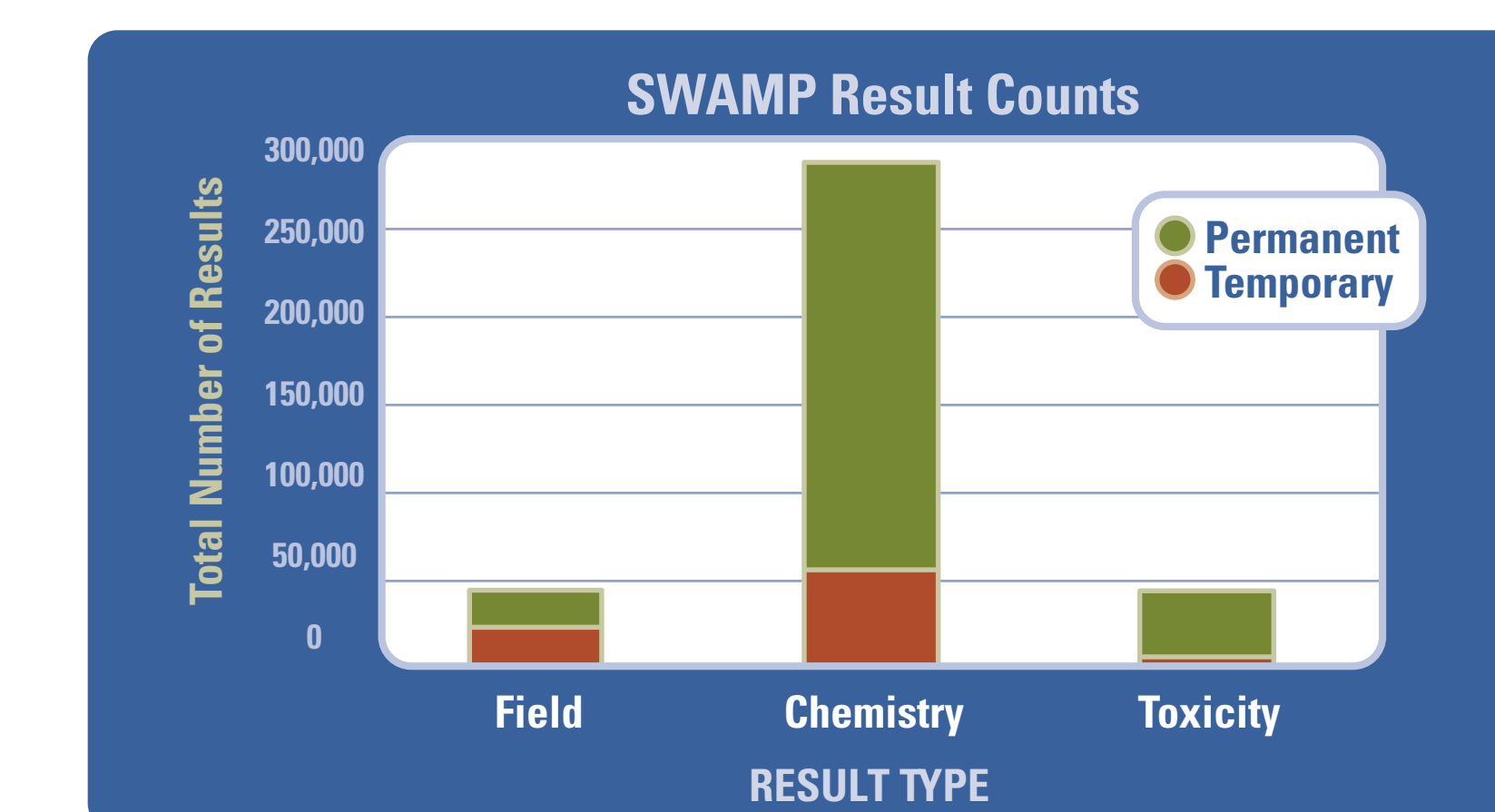
## Philosophies we started with:

- Capture analytical QA/QC information in SWAMP database
- Not store calculated values
- Have unique geo-references for all samples
- Enter data into database as "draft" and make data public after SWAMP QA/QC validation procedures are completed and documented

## Accomplishments:

Since 2002, the DMT has accomplished many goals that bring SWAMP closer to its data management vision. The DMT has:

- Collaborated with state and federal agencies to develop a database based on standardized environmental data management elements.
- Maintained an electronic data management system for integrating multiple ambient monitoring data types.
- Developed guidelines and technical specifications for data organization, flow and verification/validation to maintain SWAMP data quality and comparability.
- Worked closely with the SWAMP QA team to ensure proper coordination and communication.
- Loaded historic and current SWAMP monitoring data onto the temporary side of the database; to date, over 42,000 discrete field measurements, 290,000 analytical chemistry measurements, and 41,000 toxicity results are in the SWAMP database.



SWAMP sample and result counts for July 2005 and January 2006. Samples- Field: field measures; Chemistry: grab, integrated, MS, field duplicate, field blank; Toxicity (ToxTest): grab, integrated, field duplicate, field blank, Results-Field: field measure and field observations; Chemistry: Samples (as listed above) plus LABQA\*; Toxicity (ToxTest/ToxSum): Samples (as listed above) plus LABQA\*

\*Note: LABQA includes lab blank, filter blank, Certified Reference Material, Lab Control Spike, Lab Control Material, CNDL (Negative Control Dilution\_Tox), CNEG (Lab Negative Control\_Tox), RFST (Tox)

- Verified data on the temporary side and transferred it to the permanent side of the database.
- Developed and provided program-specific training and tools to facilitate the use of SWAMP data by SWAMP participants and worked to improve intra-agency data coordination within the California Water Boards.
- Facilitated intra- and inter-agency data comparability by developing and providing general use tools such as protocols and formats for electronic data transfer, procedures and tools for batch uploading of data, protocols and tools for data verification and validation and query and analytical tools for summarizing and analyzing data.
- Coordinated with the TMDL, Agricultural Waiver, and grant projects programs on SWAMP formats, business rules and training tools.
- Developed a framework for integrating SWAMP with CEDEN to make data available on the Internet for public access.

## Next Steps:

- In the short-term future, the DMT has several goals to:
- Continue to load current SWAMP monitoring data onto the temporary side of the database and process it through to the permanent side.
  - Continue to load historic SWAMP data.
  - Incorporate tissue data elements.
  - Incorporate bioassessment data elements.
  - Incorporate time series data elements.

## Future Plans:

- Future plans for the DMT include several long-term goals to:
- Automate more of our routine processes.
  - Expand to incorporate programs outside the ambient monitoring portion of SWAMP (such as Irrigated Lands, TMDL, Grant Projects).
  - Update the database as new technologies are developed.

The SWAMP Data Management Team is looking forward to the challenges that lay ahead. We are excited to integrate new data types that will provide a more complete monitoring picture to the data users in both the Access database and Web applications. The incorporation of additional data loading and QA/analysis tools will make data comparability easier for all SWAMP participants. This process will be greatly advanced by the integration of State Water Board (intra-agency) and non-State Water Board (inter-agency) partnerships we have developed.

Links to all SWAMP database documentation can be found at [\[http://mpsl.mlml.calstate.edu/swamp.htm\]](http://mpsl.mlml.calstate.edu/swamp.htm). Guidelines for SWAMP database comparability can also be found at this site.

## SWAMP on the Web

